Name:

at1124exam: Radicals and Squares (v912)

Question 1

Simplify the radical expressions.

$\sqrt{99}$ $\sqrt{50}$ $\sqrt{63}$

$\sqrt{3 \cdot 3 \cdot 11}$ $\sqrt{5 \cdot 5 \cdot 2}$ $\sqrt{3 \cdot 3 \cdot 7}$

$3\sqrt{11}$ $5\sqrt{2}$ $3\sqrt{7}$

Question 2

Find all solutions to the equation below:

$$2\left((x-10)^2+10\right) \;=\; 70$$

First, divide both sides by 2.

$$(x-10)^2+10=35$$

Then, subtract 10 from both sides.

$$(x-10)^2=25$$

Undo the squaring. Remember the plus-minus symbol.

$$x-10=\pm 5$$

Add 10 to both sides.

$$x=10\pm 5$$

So the two solutions are $x=15$ and $x=5$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 8x = 65$$

$$x^2 - 8x + 16 = 65 + 16$$
$$x^2 - 8x + 16 = 81$$
$$(x-4)^2 = 81$$
$$x - 4 = \pm 9$$
$$x = 4 \pm 9$$
$$x = 13 \quad \text{or} \quad x = -5$$

Question 4

Any quadratic function, with vertex at (h, k), can be expressed in vertex form:

$$y = a(x-h)^2 + k$$

A quadratic function is shown below in standard form.

$$y = 2x^2 - 24x + 69$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 2 .

$$y = 2(x^2 - 12x) + 69$$

We want a perfect square. Halve -12 and square the result to get 36 . Add and subtract that value inside the parentheses.

$$y = 2(x^2 - 12x + 36 - 36) + 69$$

Factor the perfect-square trinomial.

$$y = 2((x-6)^2 - 36) + 69$$

Distribute the 2.

$$y = 2(x-6)^2 - 72 + 69$$

Combine the constants to get **vertex form**:

$$y = 2(x-6)^2 - 3$$

The vertex is at point $(6, -3)$.